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(71) Applicant
Cuban Enterprise for the Import & Export of Medical Products

(Incorporated in Cuba)

Maximo Gomez Street No. 1, Haban City, Cuba

(72) Inventors
Manuel Suarez Muniz
Juan Rodriguez Zamora
Berto O Hernandez Gutierrez

(74) Agent and/or Address for Service
Marks & Clerk
57-60 Lincoln's Inn Fields, London, WC2A 3LS

(54) Electrode for the destruction of renal calculi

(57) An electrode construction for creating shock waves to destroy renal calculi has a core member 1 with internal threaded surface 2 carrying a support rod 3, at the configured upper end of which is carried the inwardly stepped portion of a cylindrical shank of an otherwise conical protruding apex member 4. Electrically insulating sheath 5, surrounding core member 1, carries electrically conductive cage 5 for four terminal spaced arms bent round to form at 6 a holder into which another apex member 7, identical to and opposed to member 4, is welded or soldered. The apex members are repairable, replaceable and interchangeable. The single central weld mount is easier to make, leads to less shape distortion, and wears better in use.

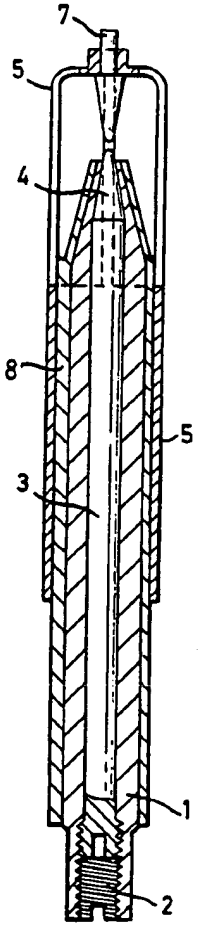

FIG.1.

The drawing(s) originally filed was(were) informal and the print here reproduced is taken from a later filed formal copy.

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For manufacture, the core 1 is internally bored and threaded and fixed within the sheath 8. Cage 5 is supported about and fixed to sheath 8 externally. An apex member 7 is welded or soldered into place. Rod 3 is suitably configured to engage threads 2, and shaped at the end to carry apex member 4. Assembly for use simply involves mounting an apex member 4 on the rod and screwing the rod into place.

The advantages of the embodiment shown are that the apex members 4 and 7 can be easily removed for refurbishment or replacement. Moreover, they are identical. The electrode can thus be used more than once. Moreover, instead of 8-piece welded construction as in German Patent 3150430, or the threepiece contruction of German Patent 3316837 there is a two-piece construction. Also, the single central weld is less distorting and complex than a series of six or more peripheral welds.

Claims.

1.An electrode construction for the creation of shock waves to destroy renal calculi comprising (a) a hollow elongate electrically conductive core member, with an internal support rod (i) capable of movement along within the core member and immobilisation relative thereto and (ii) configured at one end to carry an apex member for upward protrusion from the core member, and (b) an electrically conductive surrounding cage member electrically insulated from the core member, possessing equispaced parallel end limbs surrounding the end of the core and directed at the top towards a central region defining a holder into which a downwardly extending apex member, opposed to the core apex member, can be welded or soldered; the apex members being identical and in each case being conical at one end with an inwardly stepped cylindrical shank, whereby they are replaceable and interchangeable.

2. An electrode construction as claimed in claim 1 possessing four equispaced parallel end limbs on the cage member.

3. An electrode construction as claimed in claim 1 or 2 in which the core member is cylindrical, and fixed within an electrically insulating sheath to which the

cage member is fixed externally.

4. An electrode construction as claimed in claim 1 and substantially as herein described with reference to the drawings.

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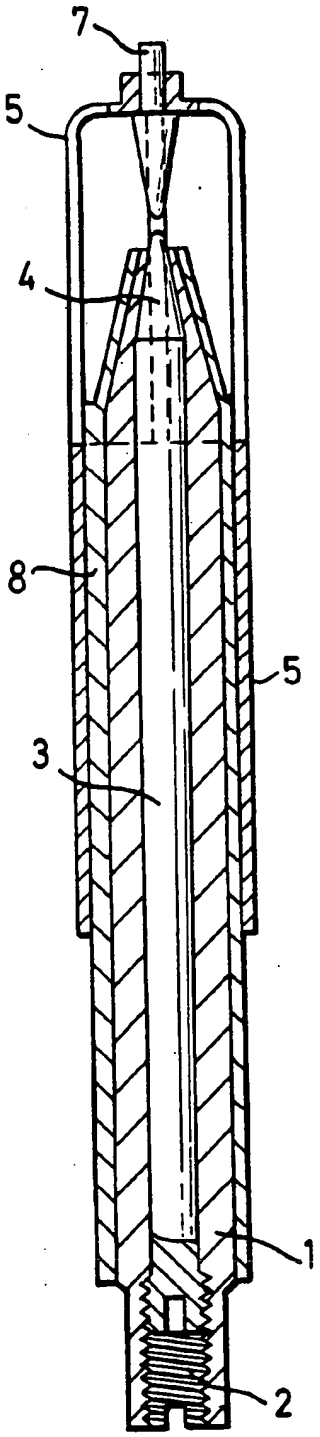

FIG.1.

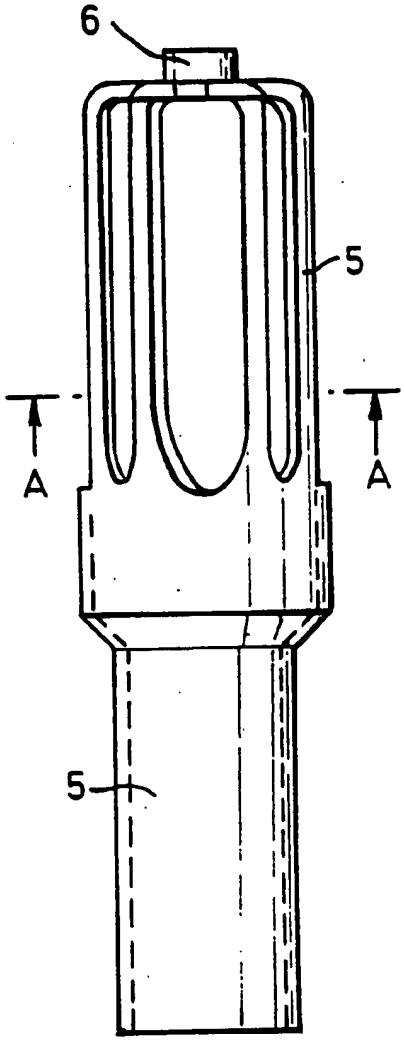

FIG.2.

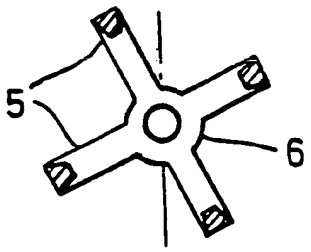

FIG.3.

ELECTRODE FOR THE DESTRUCTION OF RENAL CALCULI

THIS INVENTION is concerned with the field of medicine and relates more especially to an electrode which is capable of creating shock waves to destroy renal calculi (kidney stones).

Several types of electrode capable of destroying renal calculi are already known. German Patent 3150430 describes an electrode with a rigid core member and conical apex; a surrounding cage or socket with a elongate central space and six parallel elongate apertures in this thin socket wall; and a holder, for an opposed second conical apex, formed by welding together a corresponding six topmost elements. This design however does not possess replaceable or interchangeable conical apex portions, and can only be used once. Also, the cage or socket six-part assembly tends to distort on welding or in use, whereby the opposed conical apex positions are not accurately aligned at the centre of the electrode, so that manufacture is complicated and expensive.

German Patent 3316837 describes an electrode with a three-part surrounding cage holding a mandrel which in

turn holds a flat ended cylindrical electrode member. The central core also ends in a holding mandrel for opposed but pointed member. The electrode members are each chargeable and replaceable. However, the use of three equispaced elements to form the cage, mutually at 120°, clashes with the shape characteristics of the shock wave in use, in that at least one such element will align with the major axis of the semielliptical shape thereof, whereby the said element will eventually be eroded and destroyed. Also, the mass of the holding mandrel causes an increased strain on the cage in use and further decreases the useful life of the electrode. Moreover, such an electrode is complicated to construct and the flat end of the electrode member held by the socket causes a significant energy loss in the shock wave.

The present invention sets out to provide an electrode structure which is easier to manufacture accurately, and to use, and which permits the use of interchangeable and replaceable apex portions to the opposed electrode members.

In one aspect therefore the invention consists in an electrode construction for the creation of shock waves to destroy renal calculi comprising (a) a hollow elongate electrically conductive core member, with an internal support rod (i) capable of movement along

within the core member and immobilisation relative thereto and (ii) configured at one end to carry an apex member for upward protrusion from the core member, and (b) an electrically conductive surrounding cage member electrically insulated from the core member, possessing equispaced parallel end limbs surrounding the end of the core and directed at the top towards a central region defining a holder into which a downwardly extending apex member, opposed to the core apex member, can be welded or soldered; the apex members being identical and in each case being conical at one end with an inwardly stepped cylindrical shank, whereby they are replaceable and interchangeable.

The invention will be further described with reference to the accompanying drawings in which:-

Figure 1 is a longitudinal section through an embodiment of electrode showing the central core and surrounding cage.

Figure 2 is an elevation of the cage per se and.

Figure 3 is a section along A-A of Figure 2 looking in the direction of the arrows.

The embodiment of the invention illustrated

possesses an electrical conductive hollow cylindrical core member 1 internally threaded at 2 and having a conical open upper end. Electrically insulating sheath 8 is fitted around this core member and electrically conductive cage member 5 is fitted around the sheath 8, in each case by suitable locating fitments not shown.

Within the internal threaded core 1 is a rod 3 engageable with the threads 2 and carrying at its upper end an apex member 4 fitting within the upper conical end of the core. The apex member 4 has a conical shank to fit within a complementary formation at the top end of the rod 3. Apex member 4 can therefore be firmly and accurately held by suitable screwing-up of rod 3, or easily removed by unscrewing the rod from the core.

The cage 5 is an integral formation which extends beyond the end of the core as four parallel limbs (defining wider parallel spaces between themselves) and generally terminating in a holder construction 6 for an apex member 7, to position such member accurately opposite apex member 4. The apex member 7 is held in place by a simple weld or soldering technique. It is the same shape, i.e. has the same conical end and inwardly stepped cylindrical shank as apex member 4, whereby manufacture is simplified and the two parts are not only replaceable but also interchangeable.